

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today
(1) was not written for publication in a law journal and
(2) is not binding precedent of the Board.

Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROBERT H. HAVEMANN

Appeal No. 1998-0341
Application No. 08/476,293

ON BRIEF

Before HAIRSTON, BARRETT, and HECKER, ***Administrative Patent Judges.***

HECKER, ***Administrative Patent Judge.***

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 11 through 18, all of the claims pending in this application. The invention relates to an integrated circuit. More particularly, the invention provides a structure for

organic-containing dielectric layers with imbedded vias on a semiconductor device, allowing electrical connections between conductors above and below the organic dielectric layer.

Looking at Figure 2C, conductors 18 are located on substrate 10, and both are covered with inorganic encapsulation layer 32. Organic dielectric 22 is provided thereover, with inorganic cap layer 24 on top. The side walls of each via are covered with inorganic passivation layer 30.

Representative independent claim 11 is reproduced as follows:

11. A semiconductor device which comprises:

(a) a layer of patterned conductors formed on a substrate and having an inorganic substrate encapsulation layer deposited conformally over said conductors and said substrate;

(b) an organic-containing dielectric layer filling spaces between and covering said conductors, said organic-containing layer having a dielectric constant of less than 3.5, said organic-containing layer composed of a material containing 10% to 100% polymer by weight;

(c) a cap layer comprised of inorganic material deposited over said organic-containing layer;

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(d) at least one via etched through said cap layer,
said organic-containing layer, and said inorganic
substrate encapsulation layer;

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(e) an inorganic passivating layer deposited on the sidewalls of said via where said via passes through said organic-containing dielectric; and

(f) an electrical connection formed by filling said via with a conducting material, said electrical connection being connected to one of said patterned conductors, whereby connection can be made to a second level of patterned conductors deposited above the inorganic dielectric layer.

The Examiner relies on the following references:

Balda et al. (Balda)	4,523,372	Jun. 18, 1985
Page et al. (Page)	5,284,801	Feb. 8, 1994
Kokkotakis	EP 0 177 845	Apr. 16, 1986
(published European Patent Office Application)		

"Lithographic Patterns with a Barrier Liner," 32 *IBM Technical Disclosure Bulletin*, no. 10B, 114-115, (March 1990) (IBM).

Claims 11 through 14 and 16 through 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kokkotakis and IBM in view of Balda.

Claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kokkotakis, IBM and Balda, and further in view of Page.

Rather than reiterate the arguments of Appellant and the Examiner, reference is made to the brief and answer for the

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respective details thereof.

OPINION

After a careful review of the evidence before us, we will not sustain the rejection of claims 11 through 18 under 35 U.S.C. § 103.

The Examiner has failed to set forth a ***prima facie*** case. It is the burden of the Examiner to establish why one having ordinary skill in the art would have been led to the claimed invention by the reasonable teachings or suggestions found in the prior art, or by a reasonable inference to the artisan contained in such teachings or suggestions. ***In re Sernaker***, 702 F.2d 989, 995, 217 USPQ 1, 6 (Fed. Cir. 1983).

"Additionally, when determining obviousness, the claimed invention should be considered as a whole; there is no legally recognizable 'heart' of the invention." ***Para-Ordnance Mfg., Inc. v. SGS Importers Int'l, Inc.***, 73 F.3d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995), ***cert. denied***, 117 S. Ct. 80 (1996) (***citing W. L. Gore & Assocs., Inc. v. Garlock, Inc.***, 721 F.2d 1540, 1548, 220 USPQ 303, 309 (Fed. Cir. 1983), ***cert. denied***, 469 U.S. 851 (1984)).

With regard to the rejection of claim 11, the Examiner

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indicates that Kokkotakis and IBM disclose the claimed device except for the encapsulation layer over the patterned conductors and substrate. The Examiner notes that Balda teaches such an encapsulation layer over a conductive pattern and substrate, and concludes that it would have been obvious to use this teaching in Kokkotakis "because the inorganic 'encapsulation' layer prevents sputter etching and redepositing of the metallization during subsequent patterning of a later applied layer of organic material." (Answer-page 5).

Appellant concedes that Kokkotakis and IBM teach the elements of claim 11 except for the encapsulation layer. Also, Appellant does not challenge that Balda discloses an inorganic insulating film over conductors, which film we find to be an encapsulation layer (brief-page 6). However, Appellant argues there is no motivation to combine Balda with Kokkotakis and IBM, and that the references actually teach away from such a combination. Citing column 5, line 68-column 6, line 10, Appellant stresses that Balda finds it **important** and **imperative** that the encapsulation layer not cover the

whole surface of the device so as **not to seal** water into the organic layer. This is contrasted to Appellant's claim 11, wherein the organic layer is **sealed** by way of the encapsulation layer on the bottom, passivation layer on the via side walls, and the cap layer on top of the organic dielectric layer (brief-pages 8 and 9). We find merit in this argument.

We also find difficulty with the Examiner's reason to combine the references. The Examiner goes to great length explaining how it is the final product that counts, not the process used in obtaining it. The Examiner states:

Note that in Claim 11, the limitation "one via etched through said cap layer, said organic-containing layer, and said substrate encapsulation layer," does not structurally distinguish over Kokkotakis since it is the patentability of the final product per se which must be determined in claims having "product by process" limitations, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. When considering the final resulting device structure claimed by appellant, i.e., the final via structure defined by limitations (d) and (e), the via is nothing more than one having Kokkotakis's via structure comprising a via hole

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through an organic-containing layer with inorganic layers on the via sidewalls and over the organic-containing layer. Whether the sidewalls of limitation (e) are formed after an "etchant" step, as Kokkotakis does, or before, as claimed, is not determinative of patentability absent proof by applicants that prior art products do not necessarily or inherently possess characteristics of the claimed product, *In re Thorpe, et al.*, 227 USPQ 964.
(Answer-page 4.)

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However, the Examiner's reason to combine references is precisely a **process** consideration, i.e., "because the inorganic 'encapsulation' layer prevents sputter etching and redepositing of the metallization **during subsequent patterning** of a later applied layer of organic material." (answer-page 5). (Emphasis added.) We contrast this with one of Appellant's reasons for using the encapsulation layer, which is a **final product** reason. At page 7, lines 1-4 of the specification it states:

An additional advantage afforded by this embodiment is that organic-containing layer 22 may be completely enclosed by the passivating and encapsulating material, such that conducting material is completely isolated from organic-containing material.

The Federal Circuit states that "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." **In re Fritch**, 972 F.2d 1260, 1266 n.14, 23 USPQ2d 1780, 1783-84 n.14 (Fed. Cir. 1992), **citing In re Gordon**, 733 F.2d 900,

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902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). "Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor." ***Para-Ordnance Mfg., Inc. v. SGS Importers Int'l, Inc.*** 73 F.3d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995), ***citing W. L. Gore & Assocs., Inc. v. Garlock, Inc.***, 721 F.2d at 1551, 1553, 220 USPQ at 311, 312-13 (Fed. Cir. 1983), ***cert. denied***, 469 U.S. 851 (1984).

As pointed out above, not only does Balda teach away from the combination, the Examiner's reason to combine references runs counter to his explanation of why process considerations should be ignored. Since there is no evidence in the record that the prior art suggested the desirability of the combination, we will not sustain the Examiner's rejection of claim 11.

The remaining claims on appeal also contain the above limitations discussed with regard to claim 11, and thereby, we will not sustain the rejection as to these claims.

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We have not sustained the rejection of claims 11 through 18 under 35 U.S.C. § 103. Accordingly, the Examiner's decision is reversed.

REVERSED

KENNETH W. HAIRSTON)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
LEE E. BARRETT)	
Administrative Patent Judge)	APPEALS AND
)	
)	INTERFERENCES
)	
STUART N. HECKER)	
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SNH:hh

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